

## CLAIMS

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2  
3 1. A display device comprising a liquid container having a transparent wall  
4 portion and containing two immiscible liquids having different visual characteristics  
5 and at least one of different specific gravities and different viscosities and, means  
6 responsive to significant changes in at least one sound parameter in the vicinity  
7 of the device for injecting one liquid into another liquid at rates related to said  
8 changes to provide a visual display for viewing through the wall portion, which  
9 display reacts to at least one of music and voices.

10 2. A display device according to claim 1 wherein said significant changes  
11 are in at least one of volume and frequency.

12 3. A display device according to claim 1 wherein said means injects one  
13 liquid into the other for dispersion and suspension therein as one or more distinct  
14 globules at sizes determined by deviations from ambient sound levels.

15 4. A display device according to claim 1 wherein said means comprises a  
16 pump for injecting one of the liquids upwards as a spout from a bottom of the  
17 container into another of the liquids, said one liquid being of greater specific  
18 gravity than said another liquid, so that said one liquid disperses from the spout  
19 falls through said another liquid after injection therein.

20 5. A display device according to claim 1 wherein an injected liquid has  
21 greater opacity than a liquid into which it is injected.

22 6. A display device according to claim 4 further comprising a lamp  
23 arranged to shine upwards into the container to illuminate the display and means  
24 for changing a level of illumination provided by the lamp in response to said  
25 significant changes in said at least one sound parameter in the vicinity of the  
26 device.

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1           7. A display device according to claim 4 further comprising means for  
2 changing a level of illumination provided by the lamp in response to said  
3 significant changes in said at least one sound parameter.

4           8. A display device according to claim 4 wherein the means for changing  
5 the level of illumination provided by the lamp comprises means to increase power  
6 supplied to the lamp to increase illumination in response to a significant change  
7 in said at least one sound parameter and to progressively reduce power supplied  
8 to the lamp to dim the lamp at a rate related to a time taken for the denser liquid  
9 to fall back through the less dense liquid to a bottom of the container.

10           9. A display device according to claim 8 wherein the power increasing and  
11 reducing means comprises a voltage controlled dimmer circuit connected to  
12 supply power to the lamp and a capacitor providing control voltage for the dimmer  
13 circuit and arranged to discharge through a resistor with a time constant similar  
14 to a time taken for the denser liquid to fall back through the less dense liquid to  
15 a bottom of the container.

16           10. A display device according to claim 1 wherein said means comprises:  
17 a microphone;  
18 an amplifier connected to the microphone to amplify a signal received  
19 therefrom;  
20 a filter connected to the amplifier for extracting from an amplified signal, a  
21 signal representing one of a beat from dance music and syllabic content of  
22 speech;  
23 an amplitude envelope detector connected to the filter for detecting a short-  
24 time amplitude envelope of a signal from the filter;  
25 a long time averager and an attenuator both connected to the amplitude  
26 detector envelope for simultaneously receiving the envelope, the long-time  
27 averager creating a DC reference signal proportional to an average sound level;

1 a comparator connected to both the long time averager and to the  
2 attenuator for comparing the DC reference signal with an attenuated version of the  
3 short-time amplitude envelope from the attenuator;

4 an electric pump power controller for connection between the comparator  
5 and a power source; and,

6 an electric pump for connection to the power source by the electric pump  
7 power controller,

8 the comparator changing state when the attenuated version of the short  
9 time amplitude envelope momentarily rises above the DC reference signal  
10 proportional to the average sound level, to provide an activating signal to the  
11 pump power controller causing electric power to be delivered to the pump.

12 11. A display device according to claim 1 wherein said means comprises:

13 a microphone;

14 an amplifier connected to the microphone to amplify a signal received  
15 therefrom;

16 a filter connected to the amplifier for extracting from an amplified signal, a  
17 signal representing one of a beat from dance music and syllabic content of  
18 speech;

19 an amplitude envelope detector connected to the filter for detecting a short-  
20 time amplitude envelope of a signal from the filter;

21 a differentiator circuit connected to an output of the amplitude envelope  
22 detector to output rapidly changing signals detected by the amplitude envelope  
23 detector;

24 means providing a constant reference DC voltage ;

25 a comparator connected to both the differentiator output and the DC  
26 reference voltage;

27 an electric pump power controller for connection between the comparator  
28 and a power source; and,

29 an electric pump for connection to the power source by the electric pump  
30 power controller,

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1 the comparator changing state when the value of the differentiator output  
2 rises above the DC reference voltage, to provide an activating signal to the pump  
3 power controller causing electric power to be delivered to the pump.

4 12. A display device according to claim 11 wherein the filter is one of a  
5 200Hz low-pass filter to extract the signal representing beat from dance music and  
6 a 100-900Hz bandpass filter to extract the the signal representing the syllabic  
7 content of speech.

8 13. A display device according to claim 11 further comprising a lamp  
9 arranged to illuminate the display and connected to the power source via the  
10 power controller so that the change in state of the comparator causes power to  
11 be delivered to the lamp to increase the illumination thereof.

12 14. A display device according to claim 1 wherein said injection means  
13 comprises an electric pump comprising a first sub-assembly and a second sub-  
14 assembly, mounted outside and inside the container, respectively, the first sub  
15 assembly comprising an electric motor with a drive shaft and a cylindrical drive  
16 magnet with one axial end mounted thereon and the second sub-assembly  
17 comprising an impeller housing with a liquid inlet and a liquid outlet, a cylindrical  
18 driven magnet, and an impeller with one axial end mounted on the driven magnet,  
19 the container being integrally molded with an outwardly protruding, cylindrical  
20 magnet housing portion with a blind, outer end; the drive magnet and the driven  
21 magnet being mounted for rotation in coaxial relation surrounding and within the  
22 cylindrical housing portion, respectively, so that the drive magnet and driven  
23 magnet are magnetically coupled together, whereby the impeller is rotated by the  
24 electric motor.

25 15. A display device according to claim 14 wherein a spindle is mounted  
26 coaxially in the cylindrical housing portion housing with upper and lower axial ends

1 of the spindle supported by the impeller housing and the blind end, respectively,  
2 and the impeller is mounted for rotation on the spindle.

3 16. A display device according to claim 4 wherein said one liquid is a  
4 mixture comprising propylene glycol, glycerin and water and said another liquid  
5 consists essentially of a paraffin oil.

6 17. A display device according to claim 16 wherein said paraffin oil is 98%  
7 paraffin.

8 18. A display device according to claim 4 wherein said one liquid consists  
9 essentially of chlorinated paraffin and said another liquid consists essentially of  
10 distilled water.

11 19. A method of providing a liquid display comprising the step of co-  
12 mingling immiscible liquids of different appearances at rates determined by  
13 changes in ambient sound parameters in an audio range to provide a display  
14 which reacts to at least one of music and voices.

15 20. A method according to claim 19 wherein one of the liquids liquid is of  
16 greater specific gravity than another of the liquids and are co-mingled by injecting  
17 said one liquid from below upwardly into said another liquid so that said one liquid  
18 falls through said another liquid subsequent to injection so that the display is a  
19 geyser.